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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/824,898
Filing Date: April 02, 2001
Appellant(s): KUSHNICK, ERIC B.

John Smith-Hill
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 31, 2007 appealing from the Office action mailed June 22, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4255790	Hondeghem	3-1981
6194928	Heyne	2-2001

Christiansen et al., "TTCrx Reference Manual", July 1997, Version 2.2.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 4-8, 11, 20-21, 23-27, 30, 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hondeghem, US Patent 4255790, in view of Christiansen et al., "TTCrx Reference Manual", hereinafter Christiansen.

3. In re claim 1, Hondeghem discloses an apparatus [fig.1] for generating pulses of a third pulse sequence [A1-E1] in response to pulses of a periodic first pulse sequence [76] having a period Tp [abstract], the apparatus comprising:

- A programmable sequencer [CPU 70, RAM 84, I/O logic 112 with other associated circuitries] for changing a magnitude of the first control data [116] and a magnitude of the second control data [118] in response to each pulse of the first pulse sequence [76] such that the magnitudes of the first and second control data vary repetitively in a programmably adjustable manner [fig.2-3; col.4, l.62 – col.5, l.57; col.6, ll.20-57; program X# of times for desired repetition].

4. Hondeghem did not discuss details of generating the pulse sequences as related to resolution.

5. Christiansen discloses an apparatus [programmable fine deskew; fig.10] for generating pulses of a third pulse sequence [out] in response to pulses of a periodic first pulse sequence [in] having a period Tp [T], wherein timing of each pulse of the third pulse sequence is adjustable

with a resolution [delta t] that is smaller than period Tp [Appendix A; TTCrx Architecture], the apparatus comprising:

- First means [first DLL] for generating each pulse of a second pulse [output from mux of first DLL] sequence in response to a separate pulse of the first pulse sequence with a first delay adjustable by first control data [sel] with a resolution of Tp/N [delta tn] over a first range [T] substantially wider than Tp/M [delta tn-1], wherein M [N-1] and N are differing integers greater than one [fig.10].
- Second means [second DLL] for generating each pulse of the third pulse sequence in response to a separate pulse of the second pulse sequence with a delay adjustable by a second control data [sel] with a resolution of Tp/M [delta tn-1] over a second range [T] substantially wider than Tp/N [delta tn].
- A programmable sequencer [control and data interface] for changing a magnitude of the first control data and a magnitude of the second control data in response to each pulse of the first pulse sequence [fig.4].

6. It would have been obvious to one of ordinary skill in the art, having the teachings of Christiansen and Hondeghem before him at the time the invention was made, to modify the apparatus taught by Christiansen to include the teachings of Hondeghem, in order to obtain the apparatus comprising the various means for generating the associated pulse sequence with a desired resolution. One of ordinary skill in the art would have been motivated to make such a combination as it provides a way to provide high-resolution [picoseconds] pulse sequences [Christiansen: Appendix A; higher resolution capability lends to the desirable more accurate pulse sequence generation for apparatuses such as Hondeghem].

7. As to claims 2 and 5, Christiansen discloses, wherein M [e.g., 4] and N [e.g., 5] are relatively prime [Appendix A].

8. As to claim 4, Christiansen discloses, wherein the first range is at least as wide as (1-1/N)Tp and the second range is at least as wide as (1-1/M)Tp [Appendix A; both DLLs cover T].

9. As to claim 6, Christiansen discloses, wherein the third pulse sequence is periodic [TTCrx Architecture; output periodic clock synchronous to the system clock is produced].

10. As to claim 7, Christiansen discloses, wherein the first means comprises a plurality of first gates connected in series for generating pulses of the second pulse sequence in response to pulses of the first pulse sequence, wherein each first gate has a switching delay of Tp/N [T/N] [Appendix A].

11. As to claim 8, Christiansen discloses, wherein the second means comprises a plurality of second gates connected in series for generating pulses of the third pulse sequence in response to pulses of the second pulse sequence, wherein each second gate has a switching delay of Tp/M [T/N-1] [Appendix A].

12. As to claim 11, Christiansen discloses, wherein the first means comprises a plurality of first gates connected in series for generating pulses of the second pulse sequence in response to pulses of the first pulse sequence, wherein the second means comprises a plurality of second gates connected in series for generating pulses of the third pulse sequence in response to pulses of the second pulse sequence, wherein each first gate has a switching delay of Tp /N [T/N], and wherein each second gate has a switching delay of Tp/M [T/N-1] [Appendix A].

13. In re claim 20, Christiansen and Hondeghem disclose each and every limitation of the claim as discussed above in reference to claim 1. Christiansen and Hondeghem disclose the

apparatus; therefore, Christiansen and Hondeghem disclose the method of operating the apparatus.

14. As to claims 21 and 24, Christiansen and Hondeghem disclose each and every limitation of the claim as discussed above in reference to claims 2 and 20.

15. As to claim 23, Christiansen discloses, wherein the first and second ranges are each at least as wide as Tp [Appendix A; both DLLs cover T].

16. As to claim 25, Christiansen discloses each and every limitation of the claim as discussed above in reference to claims 6 and 20.

17. As to claim 26, Christiansen discloses each and every limitation of the claim as discussed above in reference to claims 7 and 20.

18. As to claim 27, Christiansen discloses each and every limitation of the claim as discussed above in reference to claims 8 and 20.

19. As to claim 30, Christiansen discloses each and every limitation of the claim as discussed above in reference to claims 11 and 20.

20. In re claim 34, Christiansen and Hondeghem disclose each and every limitation as discussed above in reference to claim 1. Christiansen discloses a method for generating pulses of a third pulse [out] sequence in response to pulses of a periodic first pulse sequence [in] having a period Tp [T], wherein timing of each pulse of the third pulse sequence is adjustable with a resolution [delta t] that is smaller than Tp [Appendix A; TTCrx Architecture], the method comprising the steps of:

a. Generating each pulse of a second pulse sequence [output from mux of first DLL] in response to a separate pulse of the first pulse sequence with a delay adjustable by a first control data [sel] with a resolution of Tp/N [T/N],

b. Generating each pulse of the third pulse sequence in response to a separate pulse of the second pulse sequence with a delay adjustable by a second control data [sel] with a resolution of Tp/M [T/N-1],

c. Changing a magnitude of the first control data and a magnitude of the second control data in response to each pulse of the first pulse sequence wherein M [N-1] and N are relatively prime integers greater than one [fig.10].

21. As to claim 35, Christiansen discloses, wherein step a comprises applying the first pulse sequence as input to a plurality of first gates connected in series so that the first gates generate pulses of the second pulse sequence, wherein step b comprises applying the second pulse sequence as input to a plurality of second gates connected in series so that the second gates generate pulses of the third pulse sequence, wherein each first gate has a switching delay of Tp/N [T/N], and wherein each second gate has a switching delay of Tp/M [T/N-1] [Appendix A].

22. Claims 3 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christiansen and Hondeghem as applied to claim 1 above, and further in view of Heyne, US Patent 6194928.

23. Christiansen and Hondeghem discloses each and every limitation as discussed above in reference to claim 1. Christiansen and Hondeghem did not disclose that at least one of the first and second ranges is wider than Tp.

24. Heyne discloses an apparatus [fig.1] wherein at least one of the fist and second ranges is wider than Tp [in] [abstract; col.2, ll.4-47; wider than input Tp to exceed initially].

25. It would have been obvious to one of ordinary skill in the art, having the teachings of Christiansen, Hondeghem and Hayne before him at the time the invention was made, to modify the apparatus taught by Christiansen and Hondeghem to include the teachings of Hayne, in order to obtain the claimed apparatus. One of ordinary skill in the art would have been motivated to make such a combination as it provides a way to control fluctuations caused by temperature changes in the delay elements [Hayne: col.2, ll.1-55].

(10) Response to Argument

<u>Rejection of claims 1-2, 4-8, 11, 20-21, 23-27, 30, 34-35 under 35 U.S.C. 103(a) as being unpatentable over Hondeghem in view of Christiansen.</u>

<u>Claims 1, 2, 4-8, and 11</u>

Applicant essentially argues that the references does not disclose "a programmable sequencer for changing a magnitude of the first control data and a magnitude of the second control data in response to each pulse of the first pulse sequence such that the magnitudes of the first and second control data vary repetitively in a programmably adjustable manner" because the features of Christiansen cannot be bodily incorporated into the structure of Hondeghem, ignoring what the combined teachings of the references would have suggested to one with ordinary skill in the art. Applicant's individualistic analysis of the references, although detailed with copious recitations of varying degree of relevance, does not clarify the rejection based on combination. Examiner hereby briefly presents the rejection based on Hondeghem in view of Christiansen.

Hondeghem was used as the primary reference to disclose an apparatus [fig.1] for generating pulses of a third pulse sequence [A1-E1] in response to pulses of a periodic first pulse sequence [76] having a period Tp [abstract], the apparatus comprising:

- A programmable sequencer [CPU 70, RAM 84, I/O logic 112 with other associated circuitries] for changing a magnitude of the first control data [116] and a magnitude of the second control data [118] in response to each pulse of the first pulse sequence [76] such that the magnitudes of the first and second control data vary repetitively in a programmably adjustable manner [fig.2-3; col.4, l.62 – col.5, l.57; col.6, ll.20-57; program X# of times for desired repetition].

However, Hondeghem did not discuss the details of generating the pulse sequences as related to resolution. Thus, Examiner cited Christiansen for teaching the particular Deskew Principle that can be applied by one with ordinary skill in the art to provide the means for generating the pulse sequences.

Specifically, Christiansen teaches the apparatus [programmable fine deskew; fig.10] for generating pulses of a third pulse sequence [out] in response to pulses of a periodic first pulse sequence [in] having a period Tp [T], wherein timing of each pulse of the third pulse sequence is adjustable with a resolution [delta t] that is smaller than period Tp [Appendix A; TTCrx Architecture], the apparatus comprising:

- First means [first DLL] for generating each pulse of a second pulse [output from mux of first DLL] sequence in response to a separate pulse of the first pulse sequence with a first delay adjustable by first control data [sel] with a resolution of Tp/N [delta tn] over a first

range [T] substantially wider than Tp/M [delta tn-1], wherein M [N-1] and N are differing integers greater than one [fig.10].

- Second means [second DLL] for generating each pulse of the third pulse sequence in response to a separate pulse of the second pulse sequence with a delay adjustable by a second control data [sel] with a resolution of Tp/M [delta tn-1] over a second range [T] substantially wider than Tp/N [delta tn].

It is apparent that Hondeghem and Christiansen combined disclose each and every limitation of the claims. Furthermore, the combined teachings of the references would have suggested to one with ordinary skill in the art that the Deskew Principle apparatus of Christiansen may be modified accordingly [e.g., control signals configured per manual description] for integration with the programmable sequencer of Hondeghem in order to generate the appropriate pulses [i.e., a simple engineering assignment].

The final issue is whether one with ordinary skill in the art would be motivated to incorporate the Deskew Principle teachings of Chrisitansen into the apparatus of Hondeghem. Both Hondeghem and Christiansen are involved in the field of signal generation, with Christiansen providing a specific implementation of high-resolution signal generation means. One of ordinary skill in the art would have been motivated to make such a combination as it provides a way to provide high-resolution [picoseconds] pulse sequences [Christiansen: Appendix A; higher resolution capability lends to the desirable more accurate pulse sequence generation for apparatuses such as Hondeghem].

Applicant's arguments concerning the programmable sequencer of Christiansen is not particularly relevant as the primary reference Hondeghem discloses the claimed programmable sequencer.

Applicant argues that Hondeghem does not indicate the nature or purpose of signals conveyed on lines 116 and 118. Examiner disagrees and submits that 116 and 118 are used to select the appropriate period frequency and sub-interval frequency in order to generate the sequences shown in figure 3 [col.5, ll.35-36]. These sequences may be executed in a program loop for X number of times [col.6, ll.45-48].

As such, Examiner submits that Applicant's arguments are not persuasive and maintains the rejections.

Claims 20, 21, 23-27, 30, 34 and 35

Applicant argues claims 20 and 34 according to reasons similar to those discussed in reference to claim 1. Examiner likewise maintains response as discussed in reference to claim 1.

Applicant argues that claim 23 is patentable because Hondeghem and Christiansen do not teach "the first and second ranges are each at least as wide as Tp". According to Applicant's appeal brief filed on August 31, 2007, the range is defined as the difference between the maximum and minimum delay [pg.6]. Applicant then proceeded to assert:

The resolution of the first stage is Tp/N,

The range of the first stage is Tp - (Tp/N),

The resolution of the second stage is Tp/ (N-I) and

The range of the second stage is Tp - (Tp/ (N-I)).

If we let M = N-I, then

The resolution of the first stage will be Tp/N,

The range of the first stage will be Tp - (Tp/N),

The resolution of the second stage will be Tp/ (M) and

The range of the second stage will be Tp - (Tp/M).

Examiner disagrees and submits that the resolution of a stage is ***not*** the minimum delay. According to Christiansen, the minimum delay is zero [Appendix A; K * delta T can be set to zero for minimum zero delay]. Thus, the range for both stages would be the difference between the maximum delay Tp seconds [i.e., all the delay elements are selected] and the minimum delay 0 seconds [i.e., none of the delay elements are selected], or Tp seconds.

Rejection of claims 3 and 22 under 35 U.S.C. 103(a) as being unpatentable over Hondeghem and Christiansen in view of Heyne.

Applicant argues that Heyne does not disclose "the delay range provided by either the first or second delay means is greater than the period of the IN signal". Examiner disagrees and submits the following. Christiansen teaches a finite number of possible delay ranges [i.e., Tp, or wider than Tp, would both work with the Deskew Principle as the main teaching of the principle is that the delay elements have to be related by relative prime N and N-1]. Heyne teaches choosing large delay times to compensate for the maximum fluctuation range due to temperature influences that would be germane to devices that consume power and dissipates heat [col.5, ll.28-30, ll.56-59]. Thus, it would have been obvious to one with ordinary skill in the art to try expanding the ranges of Christiansen to be wider than Tp in an attempt to compensate for the maximum fluctuation range due to temperature influences, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp [i.e., simply add an

additional delay element is well within the technical grasp]. In turn, because the apparatus wherein at least one of the first and second ranges is wider than Tp has the properties predicted by Christiansen, it would have been obvious to construct the claimed apparatus [i.e., just add an additional delay element to Christiansen would not affect the Deskew Principle as long as the relative prime relationship is maintained].

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Tse Chen

October 15, 2007

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